UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
PSC Box 20041
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MTCC 4414

STUDENT OUTLINE

POWER DRIVEN DECONTAMINATION EQUIPMENT

LEARNING OBJECTIVES

1. TERMINAL LEARNING OBJECTIVE: Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, decontaminate motor transport equipment, per the references. (35XX.03.10a)

2. ENABLING LEARNING OBJECTIVES:

(1) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, identify operating characteristics of the M17 Decontaminating Apparatus, per the reference (35XX.03.10a)

(2) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, identify the components of the M17 Decontaminating Apparatus, per the reference (35XX.03.10b)

(3) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, identify the functions of the operating controls and indicators, per the reference (35XX.03.10c)

(4) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, identify the procedures for preparing the M17 for operation, per the reference (35XX.03.10d)

(5) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, perform operator preventive maintenance checks and services (PMCS), per the reference (35XX.03.10e)

(6) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, prepare the M17 for decontaminating operations, per the reference (35XX.03.10f)

(7) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, decontaminate a vehicle using DS2 solution, per the reference (35XX.03.10g)

(8) Given a requirement to decontaminate motor transport equipment, M17 Decontaminating Apparatus, equipment and the references, decontaminate a vehicle using soapy water solution, per the reference (35XX.03.10h)

1. M-17 CHARACTERISTICS, CAPABILITIES AND FEATURES:

a. M-17 Characteristics

(1) Portable.

(2) Requires no external power source.

(3) Provides a source of hot pressurized water to decontaminate equipment.

(4) Can use water tank or natural water source.

b. Capabilities and Features

(1) Water temperature is adjustable.

(2) Uses an air-cooled, two-cycle, gasoline engine that Provides mechanical power to the water pump and to the heater fan.

(3) It has a built-in water-heating unit.

(4) Has spray wands and injectors for decontamination of equipment and shower bars for decontamination of personnel.

(5) Is provided with either a 1580-gallon (6000-liter) or 3000-gallon (11,400-liter) collapsible water tank.

2. COMPONENTS:

a. Decontaminating Apparatus

(1) Engine Fuel Can: Stores engine fuel.

(2) Heater Fuel Can: Stores heater fuel.

(3) Pump/Heater: Heats and pumps water to operate showers, spray wands, and injector.

(4) Tool Kit: Supplies hand tools required to perform maintenance on the M-17.

(5) Accessory Kit: Consists of all accessories and accessory box needed to make the M-17 operational.

(6) Cover: Provides M-17 protection against wind, rain, dust and debris when unit is not in use.

(7) Water Tank: Provides water storage for the M-17

b. Pump/Heater Assembly

(1) Control Panel: Provides operator with controls and indicators to monitor and operate the unit.

(2) Tool Box Assembly: Provides storage for heater fuel hoses and tool kit.

(3) Fuel Can Tray: Slide-out tray supports engine fuel can during M-17 operation.

(4) Pressure Relief Valve: Relives excess water pressure. Self-operating.

(5) Heat Exchanger: Uses heat created in burner to heat system water. Burner and engine exhaust gases are vented out from top of exchanger.

(6) Frame Assembly: Supports mounting of all assemblies.

(7) Handle: Four fold-up handles aid in lifting of unit.

(8) Outlet Assembly: Provides connection for attaching branch hose.

(9) Storage Area: Provides storage space for engine fuel hoses.

(10) Engine and Fan Assembly: Provides mechanical force needed to operate water pump, cooling fan, and heater fuel pump. Supplies power to electrical system.

(11) Carburetor: Controls engine starting and speed by use of throttle and choke levers.

(12) Inlet Assembly: Provides connection for attaching suction hose. Attached water pump draws water from source and supplies flow to operate the M17.

(13) Guard: Prevents injury from contact with hot surfaces of heat exchanger.

(14) Junction Box: Contains electronic control module and wiring connections.

(15) Heater Fuel Filter: Removes particles and separates water from heater fuel

(16) Burner Fuel Pump: Supplies fuel to burner.

(17) Burner: Ignites and burns heater fuel. Source of heat for heat exchanger.

c. Accessory Kit

(1) Accessory Pouch: The accessory pouch stores and protects the brushes; float inflator adapter, spare filter, spare strainer and spare igniter plug.

(2) Filter Element: Used in the suction hose. A spare filter is provided to permit continued use of M17 while dirty strainer is being cleaned.

(3) Float: Suspends suction hose above bottom of natural water source to prevent intake of mud, stones, and debris.

(4) Float Inflator Adapter: Adapts end of water tank air pump to permit inflation of float.

(5) Strainer Element: Used in the branch hose. A spare strainer is provided to permit continued use of the M-17 while the dirty strainer is being cleaned.

(6) Suction Hose: Transfers water from the water source to the inlet assembly.

(7) Brushes: Allows operator maintenance personnel to clean scale and contaminants from hose ends, fittings, and strainer screen and filter element. The two-inch diameter brush is for use with the suction hose. The one-inch diameter brush is for use with the branch hose.

(8) Branch Hose: Permits connection of two pressure hoses to the water outlet assembly. Filters pressurized water to the spray wands and showers to prevent jets from clogging.

(9) Pressure Hose (two 50 feet sections): Transfers heated water (under pressure) from the branch hose to either the injector, spray wands or the shower bars.

(10) Showers (two sets): Connected to pressure hose to provide personnel showers.

(11) Spray Wands: Connected to the pressure hose to decontaminate equipment. Hand held, trigger operated.

(12) Injector: The injector is used to apply a mixture of water and decontaminates for decontamination of equipment. Includes 50 feet of siphon tubing.

(13) Accessory Box: Provides storage for the accessories.

(14) Quick Disconnect Dust Plug: Allows one outlet of branch hose to be plugged.

(15) Igniter Plug: Is used in burner assembly. A spare igniter plug is provided to permit continued use of the M-17 when installed igniter plug fails.

d. Water Tank

(1) Water Tank: Collapsible tank holds water for use during decontamination. An inflatable collar prevents collapse of the filled tank. The cover keeps dirt out of the filled tank

and serves as a storage pouch.

(2) Pump: Hand operated pump used to inflate water tank collar and float. Stored in tank pouch

(3) Repair Kit: Contains materials required to make temporary and permanent water tank repairs. Stored in tank pouch.

(4) Placard: Contains instructions for installing temporary repair clamps. Stored in tank pouch.

(5) Pouch: Provides storage for hand pump, repair kit, and placard.

3. GENERAL CHARACTERISTICS OF THE FUNCTIONAL AREAS:

a. The Pump/heater component consists of seven functional areas: the engine, engine fuel system, electrical control system, air system, heater system, heater fuel system, and water system. These systems provide a supply of pressurized, temperature-controlled water. While the system is operating, the operator is required to periodically monitor the output water temperature and fuel supplies.

(1) Engine:

(a) the engine is a one-cylinder, two-cycle, air cooled power source that develops 7.3 horsepower at 4250 RPM.

(b) The engine has a built in generator that supplies 6 volts of actuating current at 17 watts to power the electronic control system. A manual recoil starter is used to start the engine.

b. Engine Fuel System: Fuel is supplied to the engine from a five-gallon (18.9-liter) fuel can. An in line ball pump is used to prime the fuel system. The engine will run for about 7 hours on 5 gallons of fuel.

c. Electronic Control Module: The electronic control module monitors and controls burner ignition, and monitors water pressure, flow rate, and water temperature through the use of valves, switches and thermostats to control burner ignition.

d. Air System: The air system consists of the axial vane fan enclosed in a shroud. The fan assists in drawing air from around the engine cooling fins to cool the engine, and supplies preheated air to the heat exchanger. In the heat exchanger, air supplied by the fan is used for combustion.

e. Heater System: The heat exchanger is a double-walled, convection type unit. The functional components consist of a burner and a heating coil.

f. Heater Fuel System: Fuel is supplied to the burner from the five-gallon (18.9 liter) fuel can through a strainer and fluid filter assembly by the engine driven fuel pump. The heater will run for 33 minutes on 5 gallons of heater fuel.

g. Water System:

(1) The water system consists of an over-capacity, roller type pump that is belt driven by the engine through the centrifugal clutch.

(a) The pump can provide varying flow rates at the outlet and is controlled by an automatic water pressure-regulating valve.

(b) The water pump is a self-priming pump meaning that it will draw water by itself to purge the system of air.

(2) Two flow switches, mounted in the coil inlet assembly, sense system water flow. The signals sent by the flow switches are received by the electronic control module, which controls burner ignition and output.

(a) During periods of high water flow (showers or injector in use or both spray wands actuated), both jets in the burner are activated. During periods of low water flow (only one spray wand actuated); only one burner jet is used.

4. OPERATORS CONTROLS AND INDICATORS

a. Water Tank

(1) Hand Pump Valve Fitting: Controls inflation and deflation of water tank collar. Permits connection of hand pump.

(2) Oral Inflator Valve: Allows inflation of water tank collar by mouth only when hand pump is not available.

(3) Flapper Valve Cord (2 each): When pulled, opens flapper valve allowing water to drain from tank.

(4) Flapper Valve (2 each): Drains water from tank.

b. Pump/Heater Controls and Indicators

(1) Throttle: Controls engine speed.

(2) Tickler: When depressed, holds carburetor float down allowing extra fuel to enter fuel bowl. Used to prime carburetor.

(3) Ball Pump: Squeezed by hand to start fuel flow to engine carburetor. Use of the ball pump is required before first start of the day, and restarting engine after refueling.

(4) Starter Handle: Pulled to start engine.

(5) Choke Lever: Aids engine starting in cold weather.

(6) Function Selector Switch: Three-position switch selects operating mode.

(7) Water Pressure Gauge: Indicates outgoing water pressure.

(8) Hours Meter: Indicates number of hours and minutes unit has been operating. (Meter is activated by engine vibration).

(9) Burner Fuel Valve Control: Controls water outlet temperature by regulating fuel flow to burner.

(10) Water Temperature Gauge: Indicates temperature of outgoing water.

(11) Fuel Pressure Gauge: Indicates heater fuel pressure at the outlet side of heater fuel pump.

(12) Reset Indicator Light: When lit, indicates burner did not light within allotted time. An integral switch resets the timer.

(13) Emergency Stop Switch: Stops unit operation during an emergency. Emergency stop switch should not be used in place of normal system shutdown.

(14) Override Switch: Permits burner operation when system is being flushed with antifreeze.

5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)/OPERATOR MAINTENANCE

a. Your preventive Maintenance Checks and Services are required to keep the M-17 in good operating condition.

b. Operator level deficiencies are corrected before starting the unit.

c. If necessary, troubleshooting is performed.

d. Organizational level deficiencies are reported on DA Form 2404.

e. Refer to TM 3-4230-228-10 for operator's troubleshooting procedures and operator's maintenance.

6. ASSEMBLY AND PREPARATION FOR USE OF THE M17 LDS

a. Hose Connections: The following instructions apply to all hose connections.

(1) Position cam arms toward open end of coupling.

(2) Push coupling over matching coupling.

(3) To lock connection, pull cam arms straight back and down towards hose.

(4) Tug on connection to ensure cam arms have engaged and connection is securely locked.

b. Water Tank Setup:

(1) Untie and unfold water tank.

(2) Place water tank on flat, level and debris-free

surface. Position tank so that entire bottom is in contact with the ground. Stretch to remove large wrinkles.

(a) It is correctly positioned when the solid black line is visible all around the tank.

(3) Open hand pump fitting located on collar.

(4) Remove hand pump from the pouch and thread the hand pump into the fitting. Inflate the collar until firm and quickly remove and close the fitting.

(5) Use the oral inflator valve to inflate the collar if the hand pump is lost.

(6) Ensure the cap is installed on the tank drain fitting.

(7) Fill water tank through large top opening. Tank will erect itself as it fills up.

(8) When full, place the cover over the tank opening to keep debris out of tank and store the hand pump in the pouch.

c. Suction Hose Connection:

(1) Connect the suction hose to the water inlet coupling.

(2) If water tank is being used, place suction hose strainer in tank through top opening.

(3) If a shallow water source will be used, place the suction hose strainer in a canvas pail. The pail and strainer must be positioned to prevent entry of foreign matter.

(4) If a deep natural water source is being used, complete the following steps.

(a) Connect float inflator adapter to water tank hand pump.

(b) Remove plug from float. Insert end of inflator adapter into float and inflate using hand pump.

(c) Remove inflator adapter and hand pump from

float. Install plug.

(d) Secure float to strainer chain.

(e) Place suction hose strainer and float in water. Strainer should be positioned about 12 inches below water surface.

d. Branch Hose Connection:

(1) Position the branch hose so that the strainer body is resting on the ground and the pressure hoses will be parallel to the ground.

(2) Connect branch hose to water outlet coupling and verify the connection is securely locked.

e. Pressure Hose Connections:

(1) Connect two pressure hoses to branch hose couplings.

(2) Verify connections are securely locked.

(3) If only one pressure hose is to be used, the quick disconnect dust plug may be used instead of the other pressure hose.

f. Shower Bar Assembly:

(1) Connect shower end section to shower middle section. Ensure connection is securely locked.

(2) Connect shower with hose to shower middle section. Ensure connection is securely locked.

(3) Ensure shower spray nozzles are lined up. If not, loosen connections and align.

(4) Mount assembled shower sections on a support device to hold shower bars at least 7 feet above ground.

(5) Connect pressure hose to shower end coupling. Ensure connections are securely locked.

(6) Repeat steps (1) through (5) for other shower.

g. Spray Wand Connection:

(1) Connect the pressure hose to the spray wand.

(2) Repeat the above step for the other wand.

h. Injector Connection:

(1) Connect pressure hose to injector.

(2) Water flow from the unused side of the branch hose must be blocked off by connecting either the quick disconnect dust plug or pressure hose and spray wand.

(3) Insert end of clear plastic tubing into 32-gallon container filled with decontaminates.

i. Engine Fueling:

(1) Prepare fuel mixture in empty engine fuel can by mixing 1 quart of 2-cycle oil with 5 gallons of leaded/unleaded gasoline, for the M17/M17A1.

(2) The M17A2/A3, requires 1 pint of 2-cycle oil with 5 gallons of leaded/unleaded gasoline.

(3) Extend engine fuel can storage tray.

(4) Remove engine fuel lid assembly with gasket from storage area located below the engine.

(5) Remove the fuel can lid. Install engine fuel lid assembly and gasket on fuel can. Make sure lid assembly is securely connected.

(6) Carefully position fuel can on storage tray. Make sure fuel can is positioned with engine fuel lid assembly as shown in TM-3-4230-228-10 page 2-31.

(7) Verify that the arrow labeled on the body of engine fuel filter is pointing away from ball pump.

(8) Verify that all fuel hose is not kinked.

j. Heater Fueling:

(1) Fill empty heater fuel can with five gallons of fuel listed above.

(2) Remove heater fuel lid assembly from toolbox. Ensure gasket is present.

(3) Mount full heater fuel can on frame hangar located on the opposite side of the machine as the engine fuel can.

(4) Remove lid from fuel can and screw burner fuel lid assembly into opening and tighten.

7. OPERATING PROCEDURES

a. Engine Starting

(1) Set function selector switch to off.

(2) Turn burner fuel valve control fully clockwise.

(3) If you are performing an initial start-up (water pump and hoses do not contain water), remove accessories from pressure hoses. The water pump cannot prime against air trapped in the hoses.

(4) Set engine throttle to one third of maximum.

(5) If this is the first start of the day or the engine is cold (not operated within the last hour), prime the carburetor by depressing the tickler while squeezing the ball pump until fuel drips from the carburetor to the drip pan.

(6) If choking is required (cold engine), press the choke lever down. Open the choke when the engine begins to run and then close it in short bursts as the engine warms up.

(7) If choking is not required (warm/hot engine), ensure the choke lever is fully up (open position).

(8) Pull starter handle slowly until starter engages engine. Then pull firmly and sharply. Repeat until the engine starts.

(9) After the engine starts and is running smoothly, push the throttle down to maximum.

(10) If this is the first start of the day (dry lines), slow the engine to an idle (water pump disengaged) once water flow is visible from the ends of the pressure hoses.

(11) Reconnect the accessories and open the throttle to maximum.

b. Burner Ignition:

(1) Before setting Function Selector Switch, verify:

(a) Water pressure is at least 40 psi.

(b) Fuel pressure is 95 - 105 psi.

(c) Burner fuel valve is fully clockwise.

(2) Wands mode:

(a) Set function selector switch to WANDS. Burner will automatically ignite when spray wand triggers are squeezed.

(b) Check control panel to see if RESET indicator light is on. If light is on, burner did not ignite. Push the RESET button. This should allow the burner to ignite. If it does not ignite after three tries, perform troubleshooting.

(3) Injector Mode:

(a) Set function selector switch to WANDS. Burner will automatically ignite.

(b) To draw decontaminates from container during operation position control valve over clear plastic hose.

(4) Showers Mode:

(a) Set function selector switch to SHOWERS. Burner will automatically ignite.

(5) Refueling:

(a) Perform system shutdown detailed below.

(b) Remove and replenish engine and heater fuel cans as needed.

(c) To resume mission, repeat operating procedures.

8. SHUT DOWN PROCEDURES:

a. Turn burner fuel valve fully clockwise.

b. Set function selector switch to OFF.

c. If spray wands or injector were used, squeeze the triggers on spray wands and allow water to circulate until water temperature is less than 40 degrees C. (104 deg F.).

d. If showers were used, allow engine to run and circulate water for 2 minutes.

e. If injector was used, rinse the system by drawing rinse water through the injector. Rinse for a minimum of 2 minutes or until all decontaminates is purged from the system.

f. Hold throttle lever in up position until the engine stops. If it doesn't, use the emergency stop switch.

g. Relieve water pressure from the system by squeezing the triggers on the wands if they were used.

9. PREPARATION FOR MOVEMENT

a. Hose Disconnection:

(1) Unlock couplings by pulling cam arms out and away from the hose. Push cam arms forward toward end of the coupling.

(2) Pull connected couplings apart.

b. Suction Hose Removal:

(1) Disconnect suction hose from water inlet coupling.

(2) Remove suction hose from source. Clean hose and strainer and allow to dry. Stow in accessory box.

(3) If the float was used, deflate by inserting inflator adapter in the opening. Deflate completely and replace the plug. Clean, dry and stow in the accessory box.

c. INJECTOR, SPRAY WAND, SHOWER, PRESSURE HOSE AND BRANCH HOSE REMOVAL:

(1) Disconnect all connections and drain all water from the system.

(2) Clean all items with clear, clean water and allow to dry completely.

(3) Stow in accessory box.

d. Purging:

(1) Remove engine fuel can from the storage tray and push the tray back into the frame.

(2) Remove the engine fuel can lid assembly from the fuel can and drain by squeezing the ball pump.

(3) Place the strainer end just inside the fuel can, but not in the fuel.

(4) Start the engine and set the engine speed to idle.

(5) Open throttle to maximum for five seconds and return to idle. Repeat this step three times to purge the water system of water.

(6) Reduce engine speed to idle but do not allow the engine to stall. Ensure the water pump pulley has stopped turning. Let the engine run until all fuel is used and the engine stops.

(7) Stow engine fuel line into the tray located below the engine.

(8) Loosen burner fuel line from fuel can and drain fuel from the lines.

(9) Stow lines in the toolbox.

(10) Using the screwdriver from the tool bag, remove the side panel that covers the pumps and drive belts.

(11) Place a container under the sediment bowl and drain loosening the thumbscrew.

(12) Clean the area with a rag to wipe up any spilled fuel.

(13) Replace the side panel.

(14) Place lids on fuel cans and remove from holding trays.

e. Water Tank Takedown:

(1) Pull cover off the water tank opening.

(2) Remove both caps from the tank drain fittings and pull the drain cords to allow the water to drain.

(3) Deflate the collar completely and leave the cap off.

(4) Turn the tank inside out and hang by the interior D-ring. Clean and allow the tank to dry completely.

(5) When dry, dust with talcum powder and turn right side out.

(6) Fold tank following instructions listed on page 2.50.2 and 2.51 in TM 3-4230-228-10.

REFERENCES:

1. MCWP 3-37.7/FM 3-5
2. TM 3-4230-204-12&P
3. TM 3-4230-228-10
4. TM 3-4230-288-23&P